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ABSTRACT

This guidebook and teacher's guide accompany a personal computer software program and introduce the key elements of financial projection modeling to project the financial statements of an industrial enterprise. The student will then build a model on an electronic spreadsheet. The guidebook teaches the purpose of a financial model and the steps involved in preparing, then using a model. Emphasis is on using a model not simply as a computational aid, but as an effective financial planning tool. Nine sections cover these topics: modeling financial projections, spreadsheets and projection models, projection research and assumptions, modeling the projected income statement, modeling the projected source and application of funds, modeling the projected balance sheet, modeling the projected ratio analysis, projecting a second year's data, and analyzing the complete financial projections. Appendixes include a printout of financial projection model PROJMOD and spreadsheet logic for financial projection model PROJMOD. The teacher's guide contains information on the following: course material; requirements, including course requirements, computer literacy, hardware, and software; class schedule for a five-unit course; comments on teaching methods; solutions for questions and answers; an additional exercise that can be assigned after all topics are mastered; and a chart detailing financial modeling's reliance on diverse academic subjects. (YLB)

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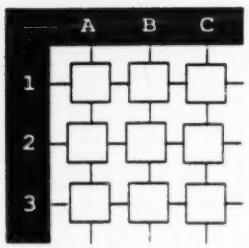
# Introduction to Financial Projection Models

*Business Management Instructional Software*

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A) Printout of Financial Projection Model PROJMOD

B) Spreadsheet Logic for Financial Projection Model PROJMOD

This guidebook introduces the key elements involved in financial projection modeling. You will learn the purpose of a financial model and will follow the steps involved in preparing, then using a model. Emphasis will be placed on using a model not simply as a computational aid, but as an effective financial planning tool.

You will build a financial planning model of your own, using an electronic spreadsheet. Representing a typical manufacturing enterprise, your model will project four financial statements. These include an Income Statement, a Source and Application of Funds, a Balance Sheet and a Ratio Analysis.

The principal accounting items found in corporate financial statements are included in your model. Simple, logical rules control their computation. These techniques form the basis for complex projections suitable for actual business use. Other modules, each stressing distinctive finance or accounting principles, may be linked as additional units of study once you have mastered these fundamentals.

To keep the PC screen display uncluttered, a planning horizon of only two periods is shown. Each period, consisting of one column, represents a full year ending on December 31st. After you have completed your initial model, columns may bere-defined to represent months, quarters, or any other period of time. Additional time periods can be included by copying the second year's logic onto subsequent spreadsheet columns.

During your work, you will learn about:

- The purpose of financial projections models
- Uses of electronic spreadsheets for financial modeling
- Deriving assumptions on which to base projections
- The structure and components of financial projections
- How to vary and analyze financial projections

## 1. Modeling Financial Projections

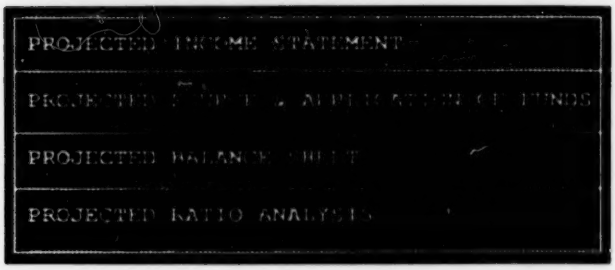
*Objectives: In this section you will learn what financial projection models are and why they are used. Their strengths and weaknesses are also considered.*

Business decision-making is a complex process in which economic events play only a partial role. Technical, social, political, historical, psychological and other non-financial, non-quantifiable factors must also be considered. But when a decision has to be made, there isn't time to list all such factors, or to trace their relationships. The task would be overwhelming. Omissions would undoubtedly take place, and the results still would, in all probability, be inaccurate.

By constructing a symbolic representation — a model, a scaled-down version of reality may be built. This process, also called "simulating," permits business decision-makers to test the feasibility of plans before investing funds.

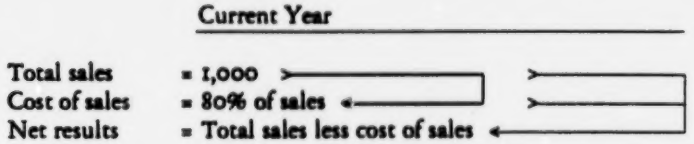
A financial model represents events in monetary terms: dollars, pesos, yen, or whatever national currency is involved. Such a model frequently resembles a set of traditional financial statements. Its purpose is to provide insight on the financial condition of an enterprise.

*Block Diagram of a Financial Projection Model*

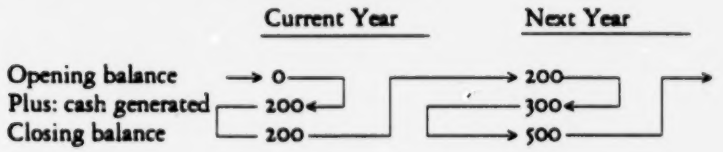


Effective models, like engines, depend upon the well-designed interaction of components. They also require control from their users to vary speed or change directions. In a financial model, the components' interaction is provided by logical statements, while control is supplied by users in the form of numerical data.

The following three-line model represents a highly condensed Income Statement. Note how each line is linked to the next:



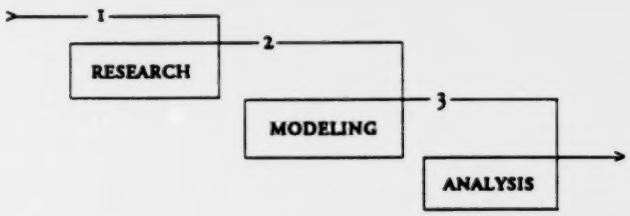

This model describes events which occur in a single period of time. Financial projection models add a new dimension by including a series of future periods. No longer static, financial projections reveal a progression of events. This transformation from static model to projection model brings with it new linkages:




These connections, extending down through a projection model's current year and across to future years, turn unconnected events into modeling systems.Relationships among line items may now be examined to determine cause and effect. Business alternatives may also be explored — a process often called "What If" analysis.

Even though great care is taken in their preparation, a model's outcome is rarely, if ever, exact. Projected results are invariably too high or too low. In spite of this, they serve an important purpose. A carefully constructed model provides an effective means to test hypotheses before taking action. If an exact prediction of future events cannot be made, trends can be examined with some meaningful degree of accuracy.

Financial projection models depend on far more than elegant construction. Both development and subsequent use must be planned with care. In total, three phases are involved in modeling:




Before a model is built, thorough research must be carried out on both the enterprise itself, and the environment in which business will be conducted. Assumptions, extracted from research, are then required to formulate the logic controlling the model's behavior. They also produce data, which interacts with logic to produce a model's results.

Once built, a model's use is not limited to production of a single report. Contrary to the popular expression, a "bottom line" does not solve complex business problems. A model has many "bottom lines;" many techniques may be required to interpret the messages they signal. The analysis phase is no less critical and demanding than the actual modeling itself.

Questions & Applications

a) What are financial projection models?

b) What are some strengths of financial projection models?

c) What are some weaknesses of financial projection models?

*Objectives: In this section you will learn why electronic spreadsheets are useful vehicles for financial projection models. You will also be given an orientation to spreadsheet use.*

An electronic spreadsheet is a computer-based application program used primarily for numerical calculations. It was developed to replace the tedious process of manually calculating financial projections. Like their paper-based counterparts, electronic spreadsheets are ruled off into a grid composed of columns and rows:

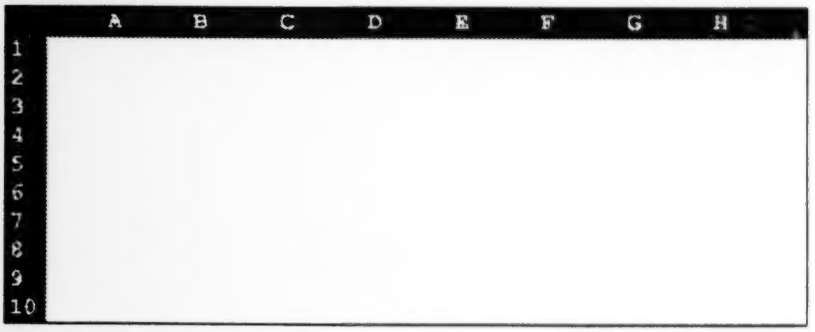
**Spreadsheet Sales Analyses**

**Rows ↓** **Columns →**

| | JAN | FEB | MAR | APR | MAY | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sales-A | 10 | 12 | 14 | 16 | 18 | 22 | 24 | 26 | 28 | 30 | 32 | 252 |
| Sales-B | 22 | 24 | 26 | 28 | 30 | 34 | 36 | 38 | 40 | 42 | 44 | 354 |
| Total | 32 | 36 | 40 | 44 | 48 | 56 | 38 | 64 | 68 | 72 | 76 | 606 |

Most spreadsheets' initial format of is similar. When the PC is turned on and the spreadsheet is accessed, one horizontal and one vertical row are visible. Letters appear on the top edge of the screen, running from left to right. These designate columns. A vertical array of numbers appears on the left-hand side of the screen, each number designating a row. The remainder of the screen is blank.

**PC Screen - Showing a Blank Spreadsheet**



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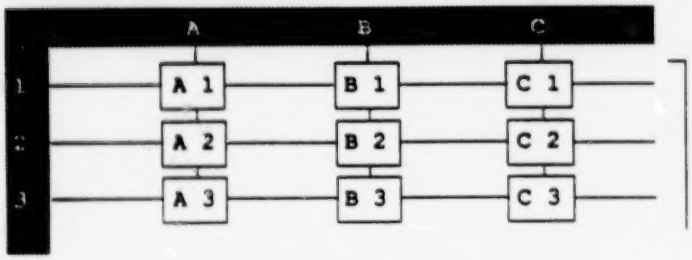
What appears to be a blank space in the center of the screen is actually a temporarily invisible grid. The areas where rows and columns intersect are known as cells. Data in the form of alphabetic characters, numbers or formulas can be placed in these cells. Numerous options for calculating, formatting, printing and displaying
data are available.

Columns are designated by letters:

Rows
(also known as lines)
are numbered

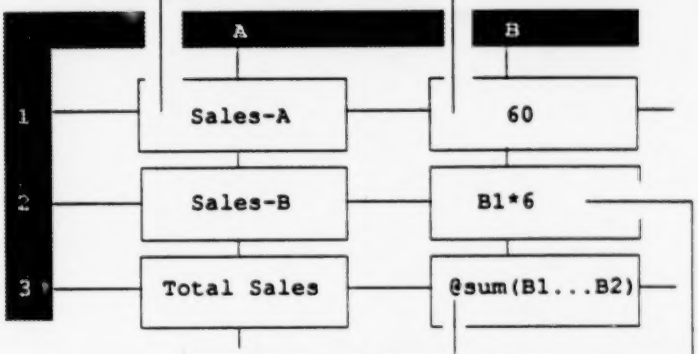



Cells:

Cells may contain words
(also called labels.)
"Sales-A" is a label.

Cells may contain
digits such as 60.

Cells may contain text
(also called labels),
digits or formulas:




Cells may contain
"functional" commands.
"@sum(...)" is a functional
command. It sums a
range of values.

Cells may contain
formula such as B1*6.
This formula
multiplies the value in
cell B1 (60) by 6.
The result is 360.

5

In building your financial projection model, you will be placing data into the blank cells of a file found on your diskette. The file is named MYPROJ. For your convenience, labels have already been keyed into the file.

You will place your cursor on the appropriate blank cell, key in your instructions and press the return key.

Before beginning to model your financial projections, be sure you are familiar with basic spreadsheet usage. Refer to your spreadsheet documentation for details.

**Questions & Applications** Follow the instructions diagrammed below:

| | |
|---|---|
| 1. Turn your PC on | • Power on?<br>• All peripherals on?<br>• Operating system loaded? |
| 2. Call up your spreadsheet | • Consult your spreadsheet manual! |
| 3. Create a test file | • Test file named?<br>• Test file saved? |
| 4. Enter test data | • Enter Sales-A and Sales-B for January, February, and March as shown on page 4 of this guidebook.<br>• Underline the two rows of sales.<br>• Add the formulas required to calculate monthly sales totals.<br>• Insert a total column for the three-month period.<br>• Save your file as 3MOSALES. |
| 5. Examine results | • Calculate file.<br>• Print your results.<br>• Check the figures for accuracy. |
| 6. Terminate your PC session | • Delete your test file.<br>• Exit from spreadsheet; exit from system.<br>• Turn your PC off. |

## 3. Projection Research & Assumptions

*Objectives: In this section you will learn how basic assumptions for financial projections are framed and how they are translated into data required by the projection model.*

### Research

Research produces the raw material needed to construct a financial projection. In carrying out research for a financial projection, two areas must be examined: the environment in which the business operates (macro events), and details about the enterprise generally under the entrepreneur's control (micro events).

**Macro Events**
(outside direct individual control)

- Health of economy
- Taxation policy
- Energy costs
- Industry performance (financial)
- Minimum wage legislation
- Other relevant economic, political & social events

**Micro Events**
(under individual control)

- Number of units to produce
- Wages (exceeding minimums)
- Product sales price
- Other financial, technical
- Capital investment & administrative details

Forecasting the outcome of macro events requires the application of knowledge and skills acquired in academic disciplines such as economics, statistics, political science and history. Estimating micro events depends on a thorough examination of details using knowledge gained from subjects such as accounting, finance, engineering and business administration.

### Assumptions

Once the macro and micro research is completed, additional refinement is needed to turn unprocessed information into data suitable for a model. Concrete assumptions must be extracted. They should be written down in a concise, well-ordered manner that follows the structure of the model itself. In their final form, these assumptions will be represented in the model either as numerical data or as logical rules used to generate numbers.

The narrative appearing on the following page summarizes the research carried out for a proposed business. Read this summary with care. It contains all the information you will need to extract data for your completed financial projection model.

## Summary of Assumptions — First Year Operations

| | |
|---|---|
| **Time Period** | Construction and operation of an assembly plant will be projected for a one-year period. The plant will produce a single product, a glass recycling furnace. |
| **Net sales** | |
| Number of units sold | 90 furnaces will be manufactured during the year. |
| Price per unit | The sales price of the assembled furnace will be $10,000 per unit. To simplify projection presentation, dollar amounts will be shown in thousands of units ($10,000 = $10). |
| **Cost of goods sold** | |
| Unit raw material cost | Raw material required to produce the product will amount to $20 per unit. |
| Production wages | The company employes one machine operator, who will be paid an annual salary of $20,000. |
| **General expenses** | |
| Management salary | The owner will receive $40,000 at year's end. |
| Sales force salary | A sales manager will be paid $30,000 a year. |
| Rental & office expenses: | Rather than construct or purchase facilities, a building will be rented ($20,000 a year.) Office expenses amount to $12,000 for the year. |
| **Deprecation** | |
| Value of fixed assets: | Equipment needed to assemble the product will cost $5,000,000 to purchase. |
| Useful life of fixed assets: | Equipment has a useful life of 20 years, and will be depreciated using the straight line method. Once depreciated, the equipment has no value. |
| **Interest** | |
| Interest rate | Interest of 8% per annum will be charged on a |
| Loan balance | bank loan balance of $2,000,000. |
| **Tax on income** | Income is taxed at an annual rate of 40%. |
| **Paid in capital** | A capital contribution of $3,000,000 will be made to the enterprise by the owner. |
| **Loan disbursements:** | The bank loan of $2,000,000 will be assumed on January 1st of the first year. |
| **Debt service:** | Repayment is not required until the first day of the second year, and will be made in two equal annual installments. |
| **Investment in plant & equipment** | Equipment, valued at $5,000,000, will be both paid for and fully installed by January 1st of the first year projected. |

**Questions & Applications** Having studied the research summary appearing on page 8, prepare the Financial Projection worksheet shown below. You will note that line numbers appear at the left of the principal items projected. These correspond to the line numbers in your projection model.

| | A | B |
|---|---|---|
| | PROJECTED INCOME | YEAR |
| | | - 1 - |
| 4 | Net sales | |
| | # _____ * $ _____ | |
| | *Number of units sold * Price per unit* | |
| 7 | Cost of goods sold | |
| | # _____ * $ _____ + $ _____ | |
| | *Number of units sold * Unit raw material cost + Production wages* | |
| 8 | General expenses | |
| | $ _____ + $ _____ + $ _____ | |
| | *Management salary + Sales force salary + Rental & office expenses* | |
| 9 | Depreciation | |
| | $ _____ / _____ Yrs. | |
| | *Value of fixed assets / Useful life of fixed assets* | |
| 10. | Interest | |
| | $ _____ * _____ % | |
| | *Loan balance * Interest rate* | |
| 14 | Tax on income | |
| | _____ % | |
| 15 | *Tax rate* | |
| | PROJECTED SOURCE & APPLICATION OF FUNDS | |
| | | - 1 - |
| 27 | Paid-in capital | $ _____ |
| 28 | Loan disbursements | $ _____ |
| 32 | Debt service | $ _____ |
| 33 | Investment in plant & equipment | $ _____ |

## 4. Modeling the Projected Income Statement

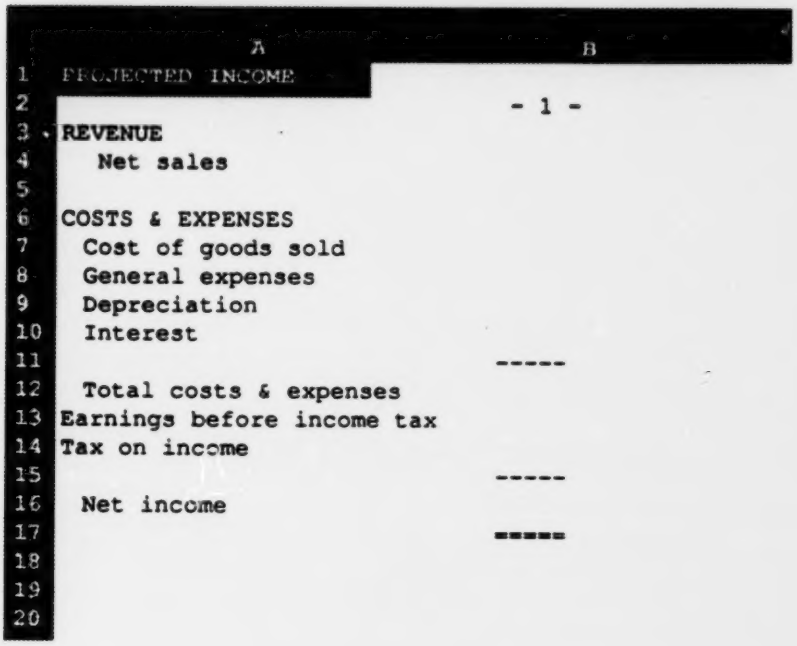
*Objectives: In this section you will learn how to project an Income Statement and how to print results.*

A Projected Income Statement focuses on the primary activities of an enterprise and measures operational success or failure. In the Income Statement, revenues are first projected. Costs and expenses related to this revenue and to the enterprise as a whole are then deducted. Some of these represent actual cash outlays. Others, such as depreciation, represent provisions for future outlays rather than actual cash expenditures. Taxes on income are then deducted to derive the net profit (or loss).

The first step in building your model will be to add the data and logic for the Projected Income Statement.

Turn your PC on, activate the spreadsheet and call up the file MYPROJ. Your cursor will be in the upper left hand corner of the mode, the [HOME] position.

*Your screen will look like this:*



| | A | B |
|---|---|---|
| 1 | PROJECTED INCOME | |
| 2 | | - 1 - |
| 3 | **REVENUE** | |
| 4 | Net sales | |
| 5 | | |
| 6 | COSTS & EXPENSES | |
| 7 | Cost of goods sold | |
| 8 | General expenses | |
| 9 | Depreciation | |
| 10 | Interest | |
| 11 | | ----- |
| 12 | Total costs & expenses | |
| 13 | Earnings before income tax | |
| 14 | Tax on income | |
| 15 | | ----- |
| 16 | Net income | |
| 17 | | ===== |
| 18 | | |
| 19 | | |
| 20 | | |

Except for titles and underlinings, the cells in column B are blank. You will place data in these cells to complete the model. In some cells, data will be numeric values, such as 90 or 10. In other cells, formulas will be used. Formulas can represent a single coordinate, for example: +B4. More complex formulas include special spreadsheet functions, parenthetic expressions and logical conditions. Example: @IF(B13>0,B13*.4,0.

The data you will enter in column B of MYPROJ's Projected Income Statement appears below. An interpretation of this data appears in italics directly beneath each expression.

| | A | B |
|---|---|---|
| 1 | Projected Income | |
| 2 | | - 1 - |
| 3 | Revenue | |
| 4 | Net sales | 90*10<br>*Number of units sold times price per unit* |
| 5 | | |
| 6 | Costs & expenses | |
| 7 | Cost of goods sold | 90*5+20<br>*Number of units sold times unit raw material costs plus production wages* |
| 8 | General expenses | 40+30+20+12<br>*Management salaries plus sales salaries plus office expenses* |
| 9 | Depreciation | 5000/20<br>*Value of fixed assets divided by useful life of fixed assets* |
| 10 | Interest | (2000-0)*.08<br>*(Cumulative loan disbursement less amortizations) times interest rate* |
| 11 | | ----- |
| 12 | Total costs & expenses | @Sum (B7..B11)<br>*Sum of all items, lines 7 through 11* |
| 13 | Earnings before income tax | +B4-B12<br>*Net sales minus total costs & expenses* |
| 14 | Tax on income | @IF(B13<=0,0,B13*.04)<br>*If no loss for year, then earnings before tax times tax rate, else 0* |
| 15 | | ----- |
| 16 | Net income | +B13-B14<br>*Earnings before tax less tax on income* |
| 17 | | ===== |
| 18 | | |
| 19 | | |
| 20 | | |



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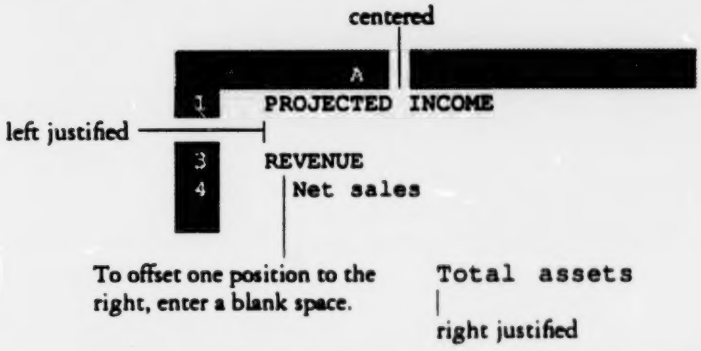
**Formatting Projections & Related Spreadsheet Conventions**

Before completing your work, examine your spreadsheet documentation for specific information on formatting text and numbers. Disregard the instructions shown below if features (such as commas separating thousands of units) are not be available.

**Text**

In MYPROJ, you will center, left justify, and right justify your text:




**Numbers**

First and last rows of the Financial Statements are shown with both a currency sign and a comma separating thousands ..... $1,000
Other rows are shown simply with commas separating thousands .... 1,000
Percentages are shown with one decimal place ..... 2.8%
Decimal values are carried to two decimal places ..... .07

**Operators**

Operators used in MYPROJ are:

* [multiplication]
/ [division]
- [subtraction]
+ [addition]

**Order of calculation and parenthetic expressions**

Spreadsheets generally follow mathematical conventions concerning the order of calculation. Expressions are calculated from left to right, performing multiplication and division, then addition and subtraction. To avoid unintended calculation results, parenthetic expressions may be introduced, for example:

5 * 2 + 5 = 15, but
5 * ( 2 + 5 ) = 35

**Division by zero**

In many spreadsheets, division by zero results in an error message. For example:

| | FORMULA | RESULT |
|---|---|---|
| | A | A |
| 1 | 100 | 100 |
| 2 | 0 | 0 |
| 3 | +A1/A2 | ERR |

One method of avoiding division by zero is to add a conditional statement to cells. Thus the statement: @if(A1/A2>0,A1/A2,0 will return 0, not ERR.

**Questions & Applications**

Follow the instructions shown below:

1. • Turn your PC on
   • Call up your spreadsheet
   • Call up MYPROJ

2. • Place your cursor on cell B4
   • Enter the data and logic required to calculate Net Sales (refer to your worksheet for data)

3. • Go to cell B7
   • Enter the data & logic needed for costs of goods sold
   • Continue entering data & logic in cells B8 to B16

4. • Calculate your projected income statement
   • Define your print range (A1..C18)
   • Print the projected income statement

5. • Review the output for accuracy; make changes if necessary, reprinting your results for verification
   • Save your file; exit from spreadsheet; exit from PC

## 5. Modeling the Projected Source & Application of Funds

*Objectives: In this section you will learn how to project a Statement of Source & Application of Funds.*

A Projected Statement of Source & Application of Funds focuses on an enterprise's entire flow of funds. Besides reintroducing items from the Income Statement, it introduces elements not yet reflected, such as capital contributions, loan disbursements and amortizations, and investment in fixed assets, such as plant and equipment. The final lines of a Projected Source & Application of Funds show an enterprise's annual and accumulated cash balances. These lines signal whether sufficient cash exists to finance the proposed activities.

The Projected Source & Application of Funds will be found on the second screen of MYPROJ. In calling up your version of the file, be sure your cursor is first in the upper left hand corner of the spreadsheet [HOME]. Then page down once.

*Your screen will look like this:*

| | A | B |
|---|---|---|
| 21 | PROJECTED SOURCE & APPLICATION OF | FUNDS |
| 22 | SOURCES | -1- |
| 23 | Internal sources: | |
| 24 | Net income | |
| 25 | Depreciation of fixed assets | |
| 26 | External sources: | |
| 27 | Paid-in capital | |
| 28 | Loan disbursements | |
| 29 | | ---- |
| 30 | Total sources | |
| 31 | APPLICATIONS | |
| 32 | Debt service | |
| 33 | Investment in plant & equipment | |
| 34 | | ---- |
| 35 | Total applications | |
| 36 | | ---- |
| 37 | Annual surplus (deficit) | |
| 38 | Accumulated surplus (deficit) | |
| 39 | | ----- |
| 40 | | |

Except for titles and underlinings, the cells in Column B are blank. You will place data in these cells to complete the model. In some cells, data will be numeric values. In other cells, formulas will be used.

The actual data you will enter in column B of MYPROJ's Projected Source & Application of Funds appears below. An interpretation of this data appears in italics directly beneath each expression.

| | A | B |
|---|---|---|
| 21 | PROJECTED SOURCE & APPLICATION OF FUNDS | |
| 22 | SOURCES | -1- |
| 23 | Internal sources: | |
| 24 | Net income | +B16 |
| | | *Copy net earnings from income statement* |
| 25 | Depreciation of fixed assets | +B9 |
| | | *Copy depreciation* |
| 26 | External sources: | |
| 27 | Paid-in capital | 3000 |
| | | *Provide data* |
| 28 | Loan disbursements | 2000 |
| | | *Provide data* |
| 29 | | ----- |
| 30 | Total sources | @sum(B23..B29) |
| | | *Sum internal sources through loan disbursements* |
| 31 | APPLICATIONS | |
| 32 | Debt service | 0 |
| | | *Provide data* |
| 33 | Investment in plant & equipment | 5000 |
| | | *Provide data* |
| 34 | | ----- |
| 35 | Total applications | @SUM(B31..B34) |
| | | *Sum debt service thru investment in plant & equipment* |
| 36 | | ----- |
| 37 | Annual surplus (deficit) | +B30-B35 |
| | | *Total sources minus total applications* |
| 38 | Accumulated surplus (deficit) | +B37 |
| | | *Accumulate annual surplus* |
| 39 | | = = = = = |
| 40 | | |



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The Purpose of Source & Application of Funds Statement is illustrated by the two years projected below. You will note that a net loss from operations recorded in the first year. However, cash flow is sufficient to produce a surplus at the end of the year.

In the second year, operations show a net profit, but cash flow is negative. By projecting both statements, problems such as these will be identified.

| | - 1 - | - 2 - |
|---|---|---|
| **REVENUE** | | |
| Net sales | $900 | $1,980 |
| **COSTS & EXPENSES** | | |
| Cost of goods sold | 470 | 930 |
| General expenses | 102 | 124 |
| Depreciation | 250 | 250 |
| Interest | 160 | 80 |
| Total costs & expenses | 982 | 1,384 |
| Earnings before income tax | ($82) | 596 |
| Tax on income | 0 | 238 |
| Net income | ($82) ← negative | $358 ← positive |

**PROJECTED SOURCE & APPLICATION OF FUNDS**

| | - 1 - | - 2 - |
|---|---|---|
| **SOURCES** | | |
| Internal sources: | | |
| Net income | ($82) | $358 |
| Depreciation of fixed assets | 250 | 250 |
| External sources: | | |
| Paid-in capital | 3,000 | 0 |
| Loan disbursements | 2,000 | 0 |
| Total sources | 5,168 | 608 |
| **APPLICATIONS** | | |
| Debt service | 0 | 1,000 |
| Investment in plant & equipment | 5,000 | 0 |
| Total applications | 5,000 | 1,000 |
| Annual surplus (deficit) | 168 | ($392) |
| Accumulated surplus (deficit) | $168 ← positive | ($224) ← negative |

**Questions & Applications**

Follow the instructions shown below:

1. • Turn your PC on
   • Call up your spreadsheet
   • Call up MYPROJ

2. • Place your cursor on cell B24
   • Enter the data and logic required to calculate net earnings

3. • Calculate your projected source & application of funds
   • Define your print range (A21..C39)
   • Print the projected source & application of funds

4. • Review the output for accuracy; make changes if necessary, reprinting your results for verification
   • Save your file; exit from spreadsheet; exit from PC

## 6. Modeling the Projected Balance Sheet

*Objectives: In this section you will learn how to project a Balance Sheet.*

A Projected Balance Sheet provides a platform from which to evaluate many aspects of the enterprise's financial condition. You will note that given a Projected Income Statement and a Projected Source & Application of Funds, no fresh data needs to be introduced in the model to produce a projected Balance Sheet. To generate it, references are simply made to items in the statements already projected.

The Projected Balance Sheet will be found on the third screen of MYPROJ. In calling up your version of the file, be sure your cursor is first in the upper left hand corner of the spreadsheet [HOME]. Then page down twice.

*Your screen will look like this:*

| | A | B |
|---|---|---|
| 41 | PROJECTED BALANCE SHEET | |
| 42 | ASSETS | -1- |
| 43 | Current assets | |
| 44 | Gross fixed assets | |
| 45 | Less: accumulated depreciation | |
| 46 | | ---- |
| 47 | Net fixed assets | |
| 48 | | ---- |
| 49 | Total assets | |
| 50 | | ===== |
| 51 | LIABILITIES & EQUITY | |
| 52 | Current liabilities | |
| 53 | Long-term debt | |
| 54 | Paid-in capital | |
| 55 | Retained earnings | |
| 56 | | ---- |
| 57 | Net worth | |
| 58 | | ---- |
| 59 | Total liabilites & net worth | |
| 60 | | ===== |

Except for titles and underlinings, the cells in column B are blank. You will place data in these cells to complete the model. In some cells, data will be numeric values. In other cells, formulas will be used.

The actual data you will enter in column B of MYPROJ's Projected Balance Sheet appears below. An interpretation of this data appears in italics directly beneath each expression.

| | A | B |
|---|---|---|
| 41 | PROJECTED BALANCE SHEET | - 1 - |
| 42 | **ASSETS** | |
| 43 | Current assets | +B38 |
| | | *Copy accumulated surplus (deficit)* |
| 44 | Gross fixed assets | +B33 |
| | | *Copy investment in plant & equipment* |
| 45 | Less: accumulated depreciation | +B9 |
| | | *Accumulate depreciation* |
| 46 | | ----- |
| 47 | Net fixed assets | +B44-B45 |
| | | *Gross fixed assets minus accumulated depreciation* |
| 48 | | ----- |
| 49 | Total assets | +B43+B47 |
| | | *Current assets plus net fixed assets* |
| 50 | | ===== |
| 51 | LIABILITIES & EQUITY | |
| 52 | Current liabilities | +B32 |
| | | *Copy debt service* |
| 53 | Long-term debt | +B28-B32-B52 |
| | | *Loan disbursements minus debt service minus current liabilities* |
| | | +A53 |
| | | *Plus long term debt (from prior year)* |
| 54 | Paid-in capital | +B27+A54 |
| | | *Accumulate paid-in capital* |
| 55 | Retained earnings | +B16+A55 |
| | | *Net earnings plus retained earnings (prior year)* |
| 56 | | ----- |
| 57 | Net worth | @SUM(B54..B55) |
| | | *Sum paid-in capital through retained earnings* |
| 58 | | ----- |
| 59 | Total liabilities & net worth | +B52+B53+B57 |
| | | *Current liabilities plus long-term debt plus net worth* |
| 60 | | |

**Questions & Applications**

Follow the instructions shown below:

1. • Turn your PC on
   • Call up your spreadsheet
   • Call up MYPROJ

2. • Place your cursor on cell B43
   • Enter the data and logic required to calculate current assets

3. • Calculate your projected balance sheet
   • Define your print range (A41..C60)
   • Print the projected balance sheet

4. • Review the output for accuracy; make changes if necessary, reprinting your results for verification
   • Save your file; exit from spreadsheet; exit from PC

## 7. Modeling the Projected Ratio Analysis

*Objectives: In this section you will learn how to model the Projected Ratio Analysis.*

The Projected Ratio Analysis provides a set of key indicators used to evaluate the financial condition, or health, of an enterprise. Expressed as ratios, these indicators are derived by referencing line items found in the financial statements projected. Six indicators have been selected for use:

| | | |
|---|---|---|
| **Profit Margin** | Net income / Sales | Measures the profitability of sales, focusing on the efficiency of operations. |
| **Return on Assets** | Net income / Total assets | Measures the profitability of an enterprise's assets. |
| **Return on Equity** | Net income / Equity | Measures the financial success of the owners' investment. To attract new capital, the rate should be competitive with other investment options. |
| **Fixed Asset Turnover** | Sales / Total assets | Measures the value of assets required to support sales. |
| **Current Ratio** | Current assets / Current liabilities | Measures the ability of a business to repay obligations due in the current year. A ratio of 2:1 (shown simply as "2" in MYPROJ) generally suggests a sound cash flow position. |
| **Debt to Total Assets** | Total debt / Total assets | Measures the degree to which an enterprise's creditors have financed assets. Both current liabilities and long term debt are included in the total debt calculation. |

The Projected Ratio Analysis will be found on the fourth screen of MYPROJ. In calling up your version of the file, be sure your cursor is first in the upper left hand corner of the spreadsheet [HOME]. Then page down three times. Your screen will look like this:

```
     A                                                    B
61   PROJECTED FINANCIAL INDICES
62                                                      -1-
63   PROFIT MARGIN =
64     Net income/Sales
65
66   RETURN ON ASSETS =
67    Net income/Total assets
68
69   RETURN ON EQUITY =
70    Net income/Stockholders' equity
71
72   FIXED ASSET TURNOVER =
73    Sales/Total assets
74
75   CURRENT RATIO =
76    Current assets/Current liabilities
77
78   DEBT TO TOTAL ASSETS =
79    Total debt/Total assets
```

Except for titles and underlinings, the cells in Column B are blank. You will place data in these cells to complete the model. In some cells, data will be numeric values. In other cells, formulas will be used.

The actual data you will enter in column B of MYPROJ's Projected Financial Indices appears below. An interpretation of this data appears in italics directly beneath each expression.

| | A | B |
|---|---|---|
| 61 | PROJECTED FINANCIAL INDICES | |
| 62 | | - 1 - |
| 63 | PROFIT MARGIN = | +B16/B4 |
| 64 | Net income/Sales | *Net income divided by Sales* |
| 65 | | |
| 66 | RETURN ON ASSETS= | +B16/B49 |
| 67 | Net income/Total assets | *Net income divided by Total sales* |
| 68 | | |
| 69 | RETURN ON EQUITY= | +B16/B57 |
| 70 | Net income/Net worth | *Net income divided by Net worth* |
| 71 | | |
| 72 | FIXED ASSET TURNOVER | +B4/B49 |
| 73 | Net sales/Total assets | *Net sales divided by Total assets* |
| 74 | | |
| 75 | CURRENT RATIO = | @IF(B52>0,B43/B52,0) |
| 76 | Current assets/ | *If Current liabilities greater than zero then Current assets* |
| | Current liabilities | *divided by Current liabilities else zero* |
| 77 | | |
| 78 | DEBIT TO TOTAL ASSETS= | (B52+B53)/B49 |
| 79 | Total debt/Total assets | *Total debt (Current liabilities plus Long-term debt)* |
| 80 | | *divided by Total assets* |

**Questions & Applications**

Follow the instructions shown below:

1. • Turn your PC on
   • Call up your spreadsheet
   • Call up MYPROJ

2. • Place your cursor on cell B63
   • Enter the data and logic required to calculate Net working capital

3. • Go to cell B66
   • Enter the data & logic needed for current ratio
   • Continue entering data & logic in cells B66 to B72

4. • Calculate your projected ratio analysis
   • Define your print range (A61..C73)
   • Print the projection

5. • Review the output for accuracy; make changes if necessary, reprinting your results for verification
   • Save your file; exit from spreadsheet; exit from PC

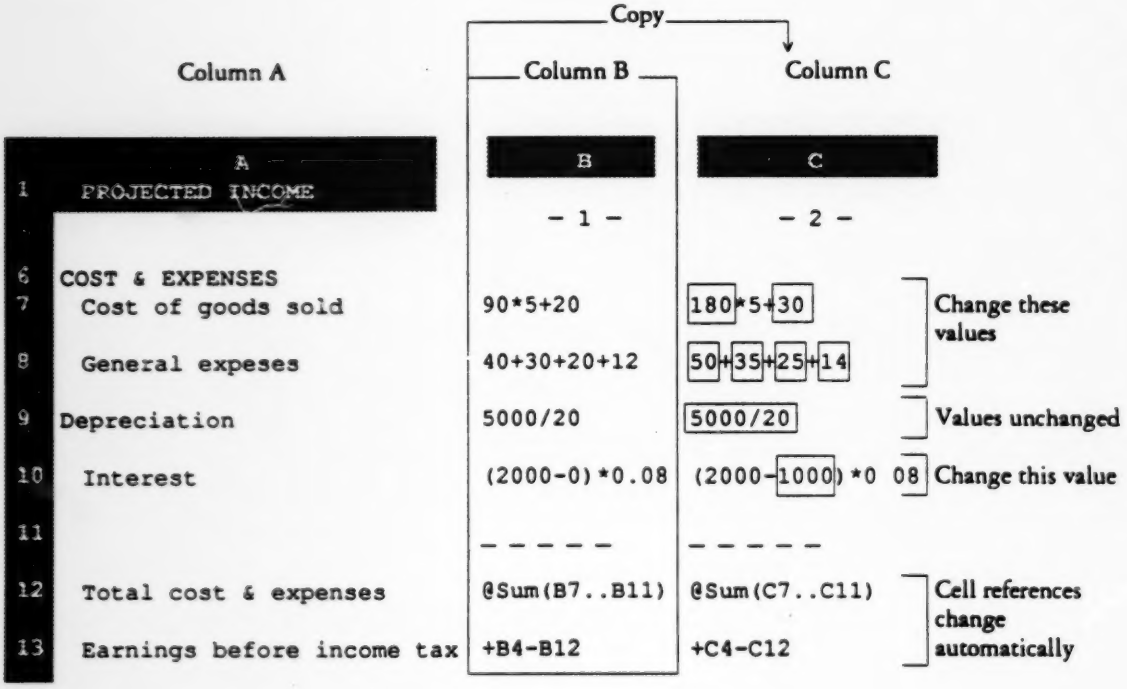
## 8. Projecting a Second Year's Data

*Objectives: In this section you will learn how to add a second year of data to the model.*

Once the first year of operations has been projected, the second year can be modelled. Relatively few changes need to be introduced to the spreadsheet: none whatsoever to the titles in column A, or to the first year's operations in column B.

The second year will be projected in column C. Keying in the logic required for each cell is not necessary. Instead, copy column B rows 1 to 79 to column C, rows 1 to 79. Then examine each newly created cell. Place your cursor on cell C1, then move down column C, editing your data as required.

Before making any changes to the data, consult the list of assumptions for "Year 2" on the following page.



## Summary of Assumptions - Second Year Operations

| | |
|---|---|
| **Time Period** | The operation of the plant will be projected for a second year. |
| **Net sales** | |
| Number of units sold | The number of furnaces manufactured will double in the second year. |
| Price per unit | The sales price per unit will increase by $1,000. |
| **Cost of goods sold** | |
| Unit raw material cost | Raw material costs will remain constant. |
| Production wages | The machine operator's salary will be increased 50%. |
| **General expenses** | |
| Management salary | The owner will be receive an additional $10,000 in the second year. |
| Sales force salary | The sales manager's salary will be increased $5,000. |
| Rental & office expenses: | Rent will be raised 25%. Office expenses will be $2,000 more than the first year. |
| **Depreciation** | |
| Value of fixed assets: | No additional equipment purchases will be made. |
| Useful life of fixed assets: | Remains 20 years. |
| **Interest** | |
| Interest rate | Interest rates remain unchanged. |
| Loan balance | The loan balance will be reduced by $1,000,000 on the 1st day of the second year. |
| **Tax on income** | Income taxes remain unchanged. |
| **Paid in capital** | No further capital contributions will be made. |
| **Loan disbursements:** | Loans were fully disbursed in the first year. |
| **Debt service:** | One loan amortization will be made on January 1st of the second year, reducing the principal owed by $1,000,000. |
| **Investment in plant & equipment** | No further purchases of equipment will be made. |

**Questions & Applications:** **Having studied the research summary appearing on the preceding page, prepare the Financial Projection worksheet shown below.**

| | A | B |
|---|---|---|
| | PROJECTED INCOME | |
| | | YEAR |
| | | - 1 - |
| 4 | Net sales | |
| | # _____ * $ _____ | |
| | *Number of units sold * Price per unit* | |
| 7 | Cost of goods sold | |
| | # _____ * $ _____ + $ _____ | |
| | *Number of units sold * Unit raw material cost + Production wages* | |
| 8 | General expenses | |
| | $ _____ + $ _____ + $ _____ | |
| | *Management salary + Sales force salary + Rental & office expenses* | |
| 9 | Depreciation | |
| | $ _____ / _____ Yrs. | |
| | *Value of fixed assets / Useful life of fixed assets* | |
| 10 | Interest | |
| | $ _____ * _____ % | |
| | *Loan balance * Interest rate* | |
| 14 | Tax on income | |
| | _____ % | |
| 15 | *Tax rate* | |
| | PROJECTED SOURCE & APPLICATION OF FUNDS | |
| | | - 1 - |
| 27 | Paid-in capital | $ _____ |
| 28 | Loan disbursements | $ _____ |
| 32 | Debt service | $ _____ |
| 33 | Investment in plant & equipment | $ _____ |

1. • Turn your PC on
   • Call up your spreadsheet
   • Call up MYPROJ

2. • Go to cell C4
   • Enter the data and logic needed for the 2nd year
   • Continue entering data and logic in cells C7 to C33

3. • Calculate your projected income statement
   • Define your print range (A1..C18)
   • Print the projections

4. • Review the output for accuracy; make changes if necessary, reprinting your results for verification
   • Save your file; exit from spreadsheet; exit from PC



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## 9. Analyzing the Complete Financial Projections

*Objectives: In this section you will learn ways to use your model as an effective planning tool.*

Your financial projection model is now complete. Printed in its entirety, the output should match Appendix A.

Analyzing the results of the financial projections requires skills and knowledge beyond those needed to create the original model. Your work should follow logical steps:

1. Study the initial projections, defining all problems
2. Determine corrective action
3. Modify the model's logic to reflect the proposed action
4. Analyze new results
5. Draw conclusions and take actions required

Techniques used to analyze projections include ratio analysis, sensitivity analysis, risk analysis, and trend line analysis. The financial indices appearing on rows 61 to 79 of MYPROJ provide the basis for a ratio analysis. These indices both measure financial condition and establish benchmarks against which alterative strategies may be tested.

Focus on one financial index — the rate of return on assets — computed by dividing net earnings by total assets. The return on assets projected for the first year's operations amounts to -1.7%. This is not satisfactory; other investments could bring you positive returns. Should then, the project be rejected? Not necessarily.

Return on assets is influenced by a number of variables under management control. These include:

- Sales price per unit
- Number of units sold
- Production costs
- Administrative costs
- Plant & equipment investment
- Financing

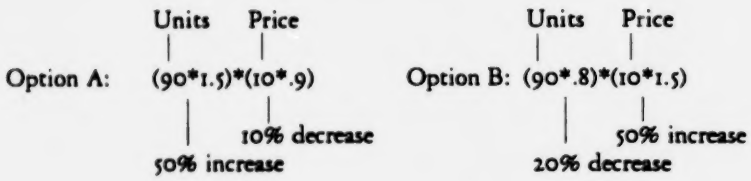
Begin by studying the effect of changing the first two variables, sales price and units sold. Assume that demand for product is not strong enough to increase both price and volume. However, sales price may be raised at the risk of losing clients (thus decreasing units sold.) Alternately, sales price may be lowered in hopes of increasing the number of units sold.

Your research shows that the number of units sold may be increased 50% if the price per unit is lowered 10%. Alternately, the sales price can be raised 50%, though unit sales will decline 20%. To simplify the exercise, assume no increase in the cost of goods sold.

These changes can now be introduced to your base projection model MYPROJ. Only once cell must be modified, cell 4B.

Net sales, defined in cell 4B as 90*10, (Number of units sold *times* Price per unit). To test alternative strategies, temporally save two copies of MYPROJ under separate names. Modifications should be made to the duplicate files only, assuring the integrity of your original model. One file will represent Option A; the second, Option B.

Modifications to be made as follows:




The implications of theses options may now be examined by reviewing the entire Financial Statement and Ratio Analysis. A few of the critical lines are reprinted below for comparative purposes.

Analysis of Selected Results:

| | Base Case | Option A | Option B |
|---|---|---|---|
| Net sales | $900 | $1,215 | $1,080 |
| Net earnings | ($82) | $140 | $59 |
| Accumulated surplus (deficit) | $168 | $390 | $309 |
| Return on equity | -2.8% | 4.5% | 1.9% |

Conclusions:

Option A will result in the highest return on equity for the owner. Units sold should be increased, price decreased.

The number of options you can test is infinite; your available time is not. Focus on reasonable assumptions which can be modelled in a reasonable amount of time. And always keep an objective focus on the enterprise being modeled. Building an elegant projection system can too easily take on a life of its own, destroying the model's use as a serviceable financial tool.

**Questions & Applications** New equipment has just become available to increase productivity. However, there are added costs associated with this option which you as financial advisor must quantify, model and evaluate. Details are as follows:

**New information**

1. The additional equipment may be purchased for $500,000. It may not be leased.

2. Using this equipment, production of units will increase 25% a year. Your sales manager assures you that these additional units can be sold, provided the original sales prices are not increased.

3. The per unit cost of sales will decline 10% using the new equipment. No overtime need be scheduled; production wages need not be altered.

4. Additional financing of $500,000 investment in the first year projected (see cell B33) will be required.

5. Your bank has offered this additional amount at an interest rate of 9% p.a., repayable in one lump sum at the end of a two-year period.

6. The plant's owner holds a certificate of deposit in the amount of $500,000, presently earning interest at 7.5% p.a.

**Decision:**

Should you purchase the new equipment, or follow your original plan for a $2,000,000 investment? If you do choose to purchase the equipment, how should it be financed, by borrowing additional funds or by increasing the equity?

**Method of analysis:**

a) Make a copy of MYPROJ. Save it as MYPROJ1. Use this version to test your alternatives. Do not alter your original version of MYPROJ.

b) To facilitate analysis of the spreadsheet, row numbers should appear on the left hand column of your printout, simulating the look of a monitor's screen.

Hint:

For this effect, simply insert an additional column on the left margin of MYPROJ1. Move your cursor to the newly created cell A1; key in the number one. Go to Cell A2 and add the formula 1+A1. Copy this formula from cell A2 to cell A79. Column A will now correspond to the spreadsheet row numbers.

c) Introduce the changes in MYPROJ1 provided under "new information" above. Save these modifications.

d) Print the results. State concisely on the bottom of the projection whether you should purchase the new equipment or follow your original plan.

e) Modify MYPROJ1 as required to determine if the equipment should be financed by borrowing additional funds or rasing equity. Again justify your decision briefly in writing.

**Appendices:**

A) Printout of Financial Projection Model PROJMOD

B) Spreadsheet Logic for Financial Projection Model PROJMOD

| | A | B | C |
|---|---|---|---|
| 1 | PROJECTED INCOME | | |
| 2 | | - 1 - | - 2 - |
| 3 | **REVENUE** | $900 | $1,980 |
| 4 | Net sales | | |
| 5 | | | |
| 6 | **COSTS & EXPENSES** | | |
| 7 | Cost of goods sold | 470 | 930 |
| 8 | General expenses | 102 | 124 |
| 9 | Depreciation | 250 | 250 |
| 10 | Interest | 160 | 80 |
| 11 | | --- | --- |
| 12 | Total costs & expenses | 982 | 1,384 |
| 13 | Earnings before income tax | (82) | 596 |
| 14 | Tax on income | 0 | 238 |
| 15 | | --- | --- |
| 16 | Net income | ($82) | $358 |
| 17 | | ===== | ===== |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | PROJECTED SOURCE & APPLICATION OF FUNDS | | |
| 22 | SOURCES | - 1 - | - 2 - |
| 23 | Internal sources: | | |
| 24 | Net income | ($82) | $358 |
| 25 | Depreciation of fixed assets | 250 | 250 |
| 26 | External sources: | | |
| 27 | Paid-in capital | 3,000 | 0 |
| 28 | Loan disbursements | 2,000 | 0 |
| 29 | | --- | --- |
| 30 | Total sources | 5,168 | 608 |
| 31 | APPLICATIONS | | |
| 32 | Debt service | 0 | 1,000 |
| 33 | Investment in plant & equipment | 5,000 | |
| 34 | | --- | --- |
| 35 | Total applications | 5,000 | 1,000 |
| 36 | | --- | --- |
| 37 | Annual surplus (deficit) | 168 | (392) |
| 38 | Accumulated surplus (deficit) | $168 | ($224) |
| 39 | | ===== | ===== |
| 40 | | | |

continued

| | A | B | C |
|---|---|---|---|
| 41 | PROJECTED BALANCE SHEET | | |
| 42 | **ASSETS** | - 1 - | - 2 - |
| 43 | Current assets | $168 | ($224) |
| 44 | Gross fixed assets | 5,000 | 5,000 |
| 45 | Less: accumulated depreciation | 250 | 500 |
| 46 | | ----- | ----- |
| 47 | Net fixed assets | 4,750 | 4,500 |
| 48 | | ----- | ----- |
| 49 | Total assets | $4,918 | $4,276 |
| 50 | | ===== | ===== |
| 51 | LIABILITIES & EQUITY | | |
| 52 | Current liabilities | $0 | $1,000 |
| 53 | Long-term debt | 2,000 | 0 |
| 54 | Paid-in capital | 3,000 | 3,000 |
| 55 | Retained earnings | (82) | 276 |
| 56 | | ----- | ----- |
| 57 | Net worth | 2,918 | 3,276 |
| 58 | | ----- | ----- |
| 59 | Total liabilities & net worth | $4,918 | $4,276 |
| 60 | | ===== | ===== |
| 61 | PROJECTED FINANCIAL INDICES | | |
| 62 | | - 1 - | - 2 - |
| 63 | PROFIT MARGIN = | | |
| 64 | Net income/Net sales | -9.1% | 18.1% |
| 65 | | | |
| 66 | RETURN ON ASSETS = | | |
| 67 | Net income/Total assets | -1.7% | 8.4% |
| 68 | | | |
| 69 | RETURN ON EQUITY = | | |
| 70 | Net income/Net worth | -2.8% | 10.9% |
| 71 | | | |
| 72 | FIXED ASSET TURNOVER = | | |
| 73 | Net sales/Total assets | 18.3% | 46.3% |
| 74 | | | |
| 74 | CURRENT RATIO = | | |
| 76 | Current assets/Current liabilities | 0.00 | -0.22 |
| 77 | | | |
| 78 | DEBT TO TOTAL ASSETS = | | |
| 79 | Total debt/Total assets | 40.7% | 23.4% |

| | A | B | C |
|---|---|---|---|
| 1 | PROJECTED INCOME | -1- | - 2 - |
| 2 | | | |
| 3 | REVENUE | | |
| 4 | Net sales | 90*10 | 180*11 |
| 5 | | | |
| 6 | COSTS & EXPENSES | | |
| 7 | Cost of goods sold | 90*5+20 | 180*5+30 |
| 8 | General expenses | 40+30+20+12 | 50+35+25+14 |
| 9 | Depreciation | 5000/20 | 5000/20 |
| 10 | Interest | (2000-0)*0.08 | (2000-1000)*0.08 |
| 11 | | ----- | ---- |
| 12 | Total costs & expenses | @SUM(B7..B11) | @SUM(C7..C11) |
| 13 | Earnings before income tax | +B4-B12 | +C4-C12 |
| 14 | Tax on income | @IF(B13<=0,0,B13*0.4) | @IF(C13<=0,0,C13*0.4) |
| 15 | | ----- | ----- |
| 16 | Net income | +B13-B14 | +C13-C14 |
| 17 | | ===== | ===== |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | PROJECTED SOURCE & APPLICATION | OF FUNDS | |
| 22 | SOURCES | - 1 - | - 2 - |
| 23 | Internal sources: | | |
| 24 | Net income | +B16 | +C16 |
| 25 | Depreciation of fixed assets | +B9 | +C9 |
| 26 | External sources: | | |
| 27 | Paid-in capital | 3000 | 0 |
| 28 | Loan disbursements | 2000 | 0 |
| 29 | | ---- | ---- |
| 30 | Total sources | @SUM(B23..B29) | @SUM(C23..C29) |
| 31 | APPLICATIONS | | |
| 32 | Debt service | 0 | 1000 |
| 33 | Investment in plant & equipment | 5000 | |
| 34 | | ----- | ---- |
| 35 | Total applications | @SUM(B31..B34) | @SUM(C31..C34) |
| 36 | | ----- | ----- |
| 37 | Annual surplus (deficit) | +B30-B35 | +C30-C35 |
| 38 | Accumulated surplus (deficit) | +B37 | +C37+B38 |
| 39 | | ===== | ===== |
| 40 | | | |

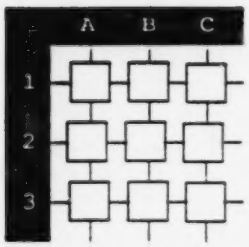
**continued**

| | A | B | C |
|---|---|---|---|
| 41 | PROJECTED BALANCE SHEET | - 1 - | - 2 - |
| 42 | **ASSETS** | | |
| 43 | Current assets | +B38 | +C38 |
| 44 | Gross fixed assets | +B33 | +C33+B44 |
| 45 | Less: accumulated depreciation | +B9 | +C9+B45 |
| 46 | | ---- | ----- |
| 47 | Net fixed assets | +B44-B45 | +C44-C45 |
| 48 | | ----- | ----- |
| 49 | Total assets | +B43+B47 | +C43+C47 |
| 50 | | ===== | ===== |
| 51 | **LIABILITIES & EQUITY** | | |
| 52 | Current liabilities | +B32 | +C32 |
| 53 | Long-term debt | +B28-B32-B52+A53 | +C28-C32-C52+B53 |
| 54 | Paid-in capital | +B27+A54 | +C27+B54 |
| 55 | Retained earnings | +B16+A55 | +C16+B55 |
| 56 | | ----- | ----- |
| 57 | Net worth | @SUM(B54..B55) | @SUM(C54..C55) |
| 58 | | ----- | ----- |
| 59 | Total liabilities & net worth | +B52+B53+B57 | +C52+C53+C57 |
| 60 | | ===== | ===== |
| 61 | PROJECTED FINANCIAL INDICES | | |
| 62 | | - 1 - | - 2 - |
| 63 | PROFIT MARGIN = | | |
| 64 | Net income/Net sales | +B16/B4 | +C16/C4 |
| 65 | | | |
| 66 | RETURN ON ASSETS = | | |
| 67 | Net income/Total assets | +B16/B49 | +C16/C49 |
| 68 | | | |
| 69 | RETURN ON EQUITY = | | |
| 70 | Net income/Net worth | +B16/B57 | +C16/C57 |
| 71 | | | |
| 72 | FIXED ASSET TURNOVER = | | |
| 73 | Net sales/Total assets | +B4/B49 | +C4/C49 |
| 74 | | | |
| 74 | CURRENT RATIO = | | |
| 76 | Current assets/Current liabilities | @IF(B52>0,B43/B52,0) | @IF(C52>0,C43/C52,0) |
| 77 | | | |
| 78 | DEBT TO TOTAL ASSETS = | | |
| 79 | Total debt/Total assets | (B52+B53)/B49 | (C52+C53)/C49 |

# Introduction to Financial Projection Models

*Business Management Instructional Software*

## Teacher's Guide

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*Introduction to Financial Projection Models* presents modeling techniques used to project the financial statements of an industrial enterprise. Statements projected include an Income Statement, a Source and Application of Funds, a Balance Sheet and a Ratio Analysis. Theory is combined with the hands-on experience of building an authentic spreadsheet financial planning model. Students will learn to develop, program, test and analyze their projections.

The model includes the principal accounting items found in corporate financial statements. Simple, logical rules control their computation. Nevertheless, techniques employed form the basis for complex projections suitable for actual business use. Other modules, each stressing distinctive finance or accounting principles, may be linked as additional units of study.

Learning to build this planning model will challenge students to use knowledge and skills learned in other core subjects. Appendix A of this manual outlines financial modeling reliance on diverse studies.

To avoid excessive class time being spent on typing labels and formatting, a preliminary template has been created. The student accesses this template and adds the data and logical expressions required.

During their work, students will learn:

- The use of electronic spreadsheets
- Financial analysis techniques
- Accounting procedures
- The structure of financial projection models
- Testing cause and effect
- How interdisciplinary knowledge is applied to financial projections

Course material for *Introduction to Financial Projection Models* includes a guidebook and a master diskette containing four files:

3MOSALES.WKS
MYPROJ.WKS
MYPROJ1.WKS
PROJMOD.WKS

MYPROJ is a spreadsheet template containing all the model labels needed by students in preparing their own projection models. Copies of MYPROJ should be made for each student.

MYPROJ1 models the alternative found in Section 9, Analyzing the Complete Financial Projections. MYPROJ1 should be used only by the instructor and should not be released to students.

PROJMOD contains the complete logic for the projection model, and is provided to verify students' results.

## B. Requirements

**Course Requirements:**

Students should have been exposed to basic accounting principles before beginning these units of study.

**Computer Literacy:**

Students should also have minimal hands-on experience with personal computers. Terms which they have mastered include: software, hardware, operating system, program and application package.

In particular, students should be familiar with spreadsheet application packages. They will load a spreadsheet, access and create files, enter simple logical statements, save and print reports. Should they lack these skills, supplementary instruction may be added at the beginning of the course.

**PC Hardware:**

An IBM PC, PCjr, PC-XT, PC-AT, PS/2, and most work-alikes with 256K or more RAM memory, at least one diskette drive, and DOS version 2.00 or higher, is required. A printer is also required for printed output.

**PC Software:**

This version of the model PROJMOD has been built on an electronic spreadsheet running on a DOS-based IBM-or-compatible personal computer. A version for Apple/Macintosh products is in preparation.

PROJMOD was developed using Borland's Quattro®. As an application package "language," Quattro is similar to that used by other widely-used spreadsheets, including: AS EASY AS 123®, Instacalc 3®, Lotus 1-2-3®, SuperCalc®, and VPPlanner®. To run the PROJMOD template (.WKS format), any of these spreadsheet application packages may be used.

## C. Class Schedule

*Introduction to Financial Projection Models* is designed as a five-unit course. Each unit requires 50 minutes of class time. Additional student preparation time of one hour before each class is recommended, but is not necessary.

| | Contents |
|---|---|
| Unit 1: Background on financial projection models | Introduction<br>1. Modeling Financial Projections |
| Unit 2: Spreadsheet essentials | 2. Spreadsheets & Modeling |
| Unit 3: Building the model | 3. Projection Research & Assumptions<br>4. Modeling the Projected Income Statement |
| Unit 4: Building the model (continued) | 5. Modeling the Projected Source & Application of Funds<br>6. Modeling the Projected Balance Sheet<br>7. Modeling the Projected Ratio Analysis |
| Unit 5: Using the model | 8. Projecting a Second Year's Data<br>9. Analyzing the Complete Financial Projections |

**Unit 1:** Before turning to their personal computers, students learn the purpose of modeling in general and of financial projection models in particular. The initial class discussion focuses on defining financial projection models and identifying their strengths and weaknesses.

**Unit 2:** Spreadsheets are discussed. Students' prior knowledge will control the amount of time required to familiarize the class with spreadsheet essentials.

**Unit 3:** Students study research techniques required for designing financial projection models. Assumptions are prepared and reviewed. As an exercise, data is extracted from a page of descriptive text, and copied to a projection worksheet. Students then begin studying and programming an Income Statement.

**Unit 4:** The projected Source & Application of Funds, Balance Sheet, and Ratio Analysis are programmed.

**Unit 5:** In a final session, students add a second year's data to their projections, then analyze the financial condition of their enterprise.

**Additional Exercises:** As an additional exercise, students can be asked to develop a financial projection model of their own, following the modeling structure already learned.

## D. Comments on Teaching Methods

Whenever possible, students should work individually at personal computer exercises. If equipment is scarce, a team approach to model building may be used effectively. Take care one member of the team does not dominate a joint effort. Spread the work load evenly among students. Allot each team member time to become familiar with spreadsheet use, keying in statements, then manipulating the data with calculation and formatting commands. When not at the keyboard, partners should observe their teammate's work carefully — and quietly. Critiquing work is an important function for each student, but should be done with tact.

The instructor should circulate among the students, suggesting solutions when problems arise. Encourage the students to work on their versions of MYPROJ, consulting PROJMOD only as a last resort. More will be learned if students attempt to build a complete model before checking the established logic.

## E. Solutions for Questions & Applications

**1. Modeling Financial Projections**

a) What are financial projection models? Financial projection models are numeric representations of a business enterprise which estimate financial values over future periods of time. They frequently resemble a condensed form of traditional financial statements.

b) What are some strengths of financial projection models? Financial projection models provide an effective means of simulating complex activities. For example, the financial statements of a large corporation may be projected rapidly and economically.

By modeling, connections may be examined between line items of financial statements. Cause and effect can be established. For example, the origin and consequences of declining cash flow may be analyzed in detail.

Financial decision-making is also facilitated by modeling. If a decision must be made, say, between debt and equity financing, options such as interest rates and repayment terms can be reviewed before making any commitment.

Future trends can be identified long before they cause damage to a business' financial condition. Erosion of a firm's capital base may not, for instance, be apparent in one or two years' time. By projecting activities for greater periods, dangers may be flagged.

The process of building a model can be as valuable to the understanding of a venture as running the model itself. A well-constructed model depends on accurate, detailed information on the business being modelled and on the environment in which it exists. Gaining a command of this knowledge is as essential for effective management as it is for constructing a financial model.

c) What are some weaknesses of financial projection models? Since future events are uncertain, the numbers projected by financial models will invariably be higher or lower than the actual figures.

Financial projection models depend on accurate research on all aspects affecting an enterprise and its activities. These may involve broad economic, political and social issues. Gaining such perfect knowledge is humanly impossible.

Even when reasonably accurate research material has been gathered, it is subject to further interpretation. Business decisions do not flow from readily available supplies of rights and wrongs.

All conclusions gained from an analysis must be quantified to be represented in a financial projection model. This includes qualitative information. The quantification of subjective evaluations is, at best, difficult.

Most models are selective, simplified versions of the activities they represent. Distortions can easily be introduced whenever financial statements are condensed or complex processes are displayed by a few lines of logic.

**2. Spreadsheets & Projection Models**

Printout of file 3MOSALES:

| | JAN | FEB | MAR | TOTAL |
|---|---|---|---|---|
| Sales-A | 10 | 12 | 14 | 36 |
| Sales-B | 22 | 24 | 26 | 72 |
| Total | 32 | 36 | 40 | 108 |

Spreadsheet logic for file 3MOSALES:

| | "JAN | "FEB | "MAR | "TOTAL |
|---|---|---|---|---|
| 'Sales-A | 10 | 12 | 14 | @SUM(C3..E3) |
| 'Sales-B | 22 | 24 | 26 | @SUM(C4..E4) |
| "Total | @SUM(C3..C5) | @SUM(D3..D5) | @SUM(E3..E5) | @SUM(F3..F5) |

**3. Projection Research & Assumptions**

Completed worksheet:

| | A | B |
|---|---|---|
| | PROJECTED INCOME | |
| | | - 1 - |
| 4 | Net sales | |
| | # 90 | * $ 10 |
| | No. of units sold | * Price per unit |
| 7 | Cost of goods sold | |
| | # 90 | * $ 5 + $ 20 |
| | No. of units sold | * Unit raw material cost + Production wages |
| 8 | General expenses | |
| | $ 40 | + $ 30 + $ 20 + 12 |
| | Management salary | + Sales force salary + Rental & office expenses |
| 9 | Depreciation | |
| | $ 5000 | / 20 Yrs. |
| | Value of fixed assets | / Useful life of fixed assets |
| 10 | Interest | |
| | $ (2000 - 0) | * .08 % |
| | Loan balance | * Interest rate |
| 14 | Tax on income | |
| | .4 % | |
| | Tax rate | |
| | PROJECTED SOURCE & APPLICATION OF FUNDS | |
| | | - 1 - |
| 27 | Paid-in capital | $ 3000 |
| 28 | Loan disbursements | $ 2000 |
| 32 | Debt service | $ 0 |
| 33 | Investment in plant & equipment | $ 2000 |

**4. Modeling the Projected Income Statement**

Printout of the Projected Income Statement:

| | A | B |
|---|---|---|
| 1 | PROJECTED INCOME | |
| 2 | | - 1 - |
| 3 | REVENUE | |
| 4 | Net sales | $900 |
| 5 | | |
| 6 | COSTS & EXPENSES | |
| 7 | Cost of goods sold | 470 |
| 8 | General expenses | 102 |
| 9 | Depreciation | 250 |
| 10 | Interest | 160 |
| 11 | | ——— |
| 12 | Total costs & expenses | 982 |
| 13 | Earnings before income tax | (82) |
| 14 | Tax on income | 0 |
| 15 | | ——— |
| 16 | Net income | ($82) |
| 17 | | ===== |
| 18 | | |
| 19 | | |
| 20 | | |

**5. Modeling the Projected Source & Application of Funds**

Printout of the Projected Source & Application of Funds:

| | | |
|---|---|---|
| 21 | PROJECTED SOURCE & APPLICATION OF FUNDS | |
| 22 | SOURCES | - 1 - |
| 23 | Internal sources: | |
| 24 | Net income | ($82) |
| 25 | Depreciation of fixed assets | 250 |
| 26 | External sources: | |
| 27 | Paid-in capital | 3,000 |
| 28 | Loan disbursements | 2,000 |
| 29 | | ——— |
| 30 | Total sources | 5,168 |
| 31 | APPLICATIONS | |
| 32 | Debt service | 0 |
| 33 | Investment in plant & equipment | 5,000 |
| 34 | | ——— |
| 35 | Total applications | 5,000 |
| 36 | | ——— |
| 37 | Annual surplus (deficit) | 168 |
| 38 | Accumulated surplus (deficit) | $168 |
| 39 | | ===== |
| 40 | | |

**6. Modeling the Projected Balance Sheet**

Printout of the Projected Balance Sheet:

| | A | B |
|---|---|---|
| 41 | PROJECTED BALANCE SHEET | |
| 42 | ASSETS | - 1 - |
| 42 | Current assets | $168 |
| 44 | Gross fixed assets | 5,000 |
| 45 | Less: accumulated depreciation | 250 |
| 46 | | |
| 47 | Net fixed assets | 4,750 |
| 48 | | |
| 49 | Total assets | $4,918 |
| 50 | | ===== |
| 51 | LIABILITIES & EQUITY | |
| 52 | Current liabilities | $0 |
| 53 | Long-term debt | 2,000 |
| 54 | Paid-in capital | 3,000 |
| 55 | Retained earnings | (82) |
| 56 | | |
| 57 | Net worth | 2,918 |
| 58 | | |
| 59 | Total liabilities & net worth | $4,918 |
| 60 | | ===== |

**7. Modeling the Projected Ratio Analysis**

Printout of the Projected Ratio Analysis:

| | | |
|---|---|---|
| 61 | PROJECTED FINANCIAL INDICES | |
| 62 | | - 1 - |
| 63 | PROFIT MARGIN = | |
| 64 | Net income/Net sales | -9.1% |
| 65 | | |
| 66 | RETURN ON ASSETS = | |
| 67 | Net income/Total assets | -1.7% |
| 68 | | |
| 69 | RETURN ON EQUITY = | |
| 70 | Net income/Net worth | -2.8% |
| 71 | | |
| 72 | FIXED ASSET TURNOVER = | |
| 73 | Net sales/Total assets | 18.3% |
| 74 | | |
| 75 | CURRENT RATIO = | |
| 76 | Current assets/Current liabilities | 0.00 |
| 77 | | |
| 78 | DEBT TO TOTAL ASSETS = | |
| 79 | Total debt/Total assets | 40.7% |

**8. Projecting a Second Year's Data**

Printout of the Second Year's Data:

| | A | C |
|---|---|---|
| 1 | PROJECTED INCOME | |
| 2 | | - 2 - |
| 3 | REVENUE | |
| 4 | Net sales | $1,980 |
| 5 | | |
| 6 | COSTS & EXPENSES | |
| 7 | Cost of goods sold | 930 |
| 8 | General expenses | 124 |
| 9 | Depreciation | 250 |
| 10 | Interest | 80 |
| 11 | | ——— |
| 12 | Total costs & expenses | 1,384 |
| 13 | Earnings before income tax | 596 |
| 14 | Tax on income | 238 |
| 15 | | ——— |
| 16 | Net income | $358 |
| 17 | | ===== |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | PROJECTED SOURCE & APPLICATION OF FUNDS | |
| 22 | SOURCES | - 2 - |
| 23 | Internal sources: | |
| 24 | Net income | $358 |
| 25 | Depreciation of fixed assets | 250 |
| 26 | External sources: | |
| 27 | Paid-in capital | 0 |
| 28 | Loan disbursements | 0 |
| 29 | | ——— |
| 30 | Total sources | 608 |
| 31 | APPLICATIONS | |
| 32 | Debt service | 1,000 |
| 33 | Investment in plant & equipment | 0 |
| 34 | | ——— |
| 35 | Total applications | 1,000 |
| 36 | | ——— |
| 37 | Annual surplus (deficit) | (392) |
| 38 | Accumulated surplus (deficit) | ($224) |
| 39 | | ===== |
| 40 | | |

**Printout of the Second Year's Data (continued):**

| | A | C |
|---|---|---|
| 41 | PROJECTED BALANCE SHEET | |
| 42 | ASSETS | - 2 - |
| 43 | Current assets | ($224) |
| 44 | Gross fixed assets | 5,000 |
| 45 | Less: accumulated depreciation | 500 |
| 46 | | |
| 47 | Net fixed assets | 4,500 |
| 48 | | |
| 49 | Total assets | $4,276 |
| 50 | | ===== |
| 51 | LIABILITIES & EQUITY | |
| 52 | Current liabilities | $1,000 |
| 53 | Long-term debt | 0 |
| 54 | Paid-in capital | 3,000 |
| 55 | Retained earnings | 276 |
| 56 | | |
| 57 | Net worth | 3,276 |
| 58 | | |
| 59 | Total liabilities & net worth | $4,276 |
| 60 | | ===== |
| 61 | PROJECTED FINANCIAL INDICES | |
| 62 | | - 2 - |
| 63 | PROFIT MARGIN = | |
| 64 | Net income/Net sales | 18.1% |
| 65 | | |
| 66 | RETURN ON ASSETS = | |
| 67 | Net income/Total assets | 8.4% |
| 68 | | |
| 69 | RETURN ON EQUITY = | |
| 70 | Net income/Net worth | 10.9% |
| 71 | | |
| 72 | FIXED ASSET TURNOVER = | |
| 73 | Net sales/Total assets | 46.3% |
| 74 | | |
| 75 | CURRENT RATIO = | |
| 76 | Current assets/Current liabilities | -0.22 |
| 77 | | |
| 78 | DEBT TO TOTAL ASSETS = | |
| 79 | Total debt/Total assets | 23.4% |

Spreadsheet Logic for File MYPROJ1 new information on equipment):

| | A | B | |
|---|---|---|---|
| 1 | PROJECTED INCOME | | |
| 2 | | - 1 - | |
| 3 | REVENUE | | |
| 4 | Net sales | (90*1.5)*10 | <— |
| 6 | COSTS & EXPENSES | | |
| 7 | Cost of goods sold | (90*1.5)*(5*0.9)+20 | <— |
| 10 | Interest | (2000-0)*0.08+(500*0.09) | <— |
| 21 | PROJECTED SOURCE & APPLICATION OF FUNDS | | |
| 22 | SOURCES | - 1 - | |
| 26 | External sources: | | |
| 28 | Loan disbursements | 2000+500 | <— |
| 31 | APPLICATIONS | | |
| 33 | Investment in plant & equipment | 5000+500 | <— |

## 9. Analyzing the Complete Financial Projections

Printout of File MYPROJ1 (altered lines highlighted with "<—"):

| | A | B | |
|---|---|---|---|
| 1 | PROJECTED INCOME | | |
| 2 | | - 1 - | |
| 3 | REVENUE | | |
| 4 | Net sales | $1,350 | <— |
| 5 | | | |
| 6 | COSTS & EXPENSES | | |
| 7 | Cost of goods sold | 628 | <— |
| 8 | General expenses | 102 | |
| 9 | Depreciation | 250 | |
| 10 | Interest | 205 | <— |
| 11 | | ===== | |
| 12 | Total costs & expenses | 1,185 | |
| 13 | Earnings before income tax | 166 | |
| 14 | Tax on income | 66 | |
| 15 | | ——— | |
| 16 | Net income | $99 | |
| 17 | | ===== | |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | PROJECTED SOURCE & APPLICATION OF FUNDS | | |
| 22 | SOURCES | - 1 - | |
| 23 | Internal sources: | | |
| 24 | Net income | $99 | |
| 25 | Depreciation of fixed assets | 250 | |
| 26 | External sources: | | |
| 27 | Paid-in capital | 3,000 | |
| 28 | Loan disbursements | 2,500 | <— |
| 29 | | ——— | |
| 30 | Total sources | 5,849 | |
| 31 | APPLICATIONS | | |
| 32 | Debt service | 0 | |
| 33 | Investment in plant & equipment | 5,500 | <— |
| 34 | | ——— | |
| 35 | Total applications | 5,500 | |
| 36 | | ——— | |
| 37 | Annual surplus (deficit) | 349 | |
| 38 | Accumulated surplus (deficit) | $349 | |
| 39 | | ===== | |
| 40 | | | |

Printout of File MYPROJ1 (continued) (altered lines highlighted with "<—" ):

| | A | B |
|---|---|---|
| 41 | PROJECTED BALANCE SHEET | |
| 42 | ASSETS | - 1 - |
| 43 | Current assets | $349 |
| 44 | Gross fixed assets | 5,500 |
| 45 | Less: accumulated depreciation | 250 |
| 46 | | ----- |
| 47 | Net fixed assets | 5,250 |
| 48 | | ----- |
| 49 | Total assets | $5,599 |
| 50 | | ==== |
| 51 | LIABILITIES & EQUITY | |
| 52 | Current liabilities | $0 |
| 53 | Long-term debt | 2,500 |
| 54 | Paid-in capital | 3,000 |
| 55 | Retained earnings | 99 |
| 56 | | ----- |
| 57 | Net worth | 3,099 |
| 58 | | ----- |
| 59 | Total liabilities & net worth | $5,599 |
| 60 | | ===== |
| 61 | PROJECTED FINANCIAL INDICES | |
| 62 | | - 1 - |
| 63 | PROFIT MARGIN = | |
| 64 | Net income/Net sales | 7.4% |
| 65 | | |
| 66 | RETURN ON ASSETS = | |
| 67 | Net income/Total assets | 1.8% |
| 68 | | |
| 69 | RETURN ON EQUITY = | |
| 70 | Net income/Net worth | 3.2% |
| 71 | | |
| 72 | FIXED ASSET TURNOVER = | |
| 73 | Net sales/Total assets | 24.1% |
| 74 | | |
| 75 | CURRENT RATIO = | |
| 76 | Current assets/Current liabilities | 0.00 |
| 77 | | |
| 78 | DEBT TO TOTAL ASSETS = | |
| 79 | Total debt/Total assets | 44.6% |

Given the information, purchase of new equipment is recommended. The profit margin would improve -9.1% to 7.4%.

e) If the $500,000 is obtained by increasing equity rather than borrowing at 9% p.a., the return on equity would decline from 3.2% to 2.8% (unfavorable). The ratio of debit to total assets would decline, from 44.6% to 35.7% (favorable), while all other ratios would remain the same. Considering the opportunity cost of capital, borrowing appears preferable to increasing equity.

## F. Additional Exercise

Having mastered all topics covered in *Introduction to Financial Projection Models*, the following exercise can be assigned:

1. Students, either individually or in teams, form hypothetical small businesses.

2. Details concerning two years' operations are developed for each business. See *Introduction to Financial Projection Models*, Chapter 3, for the format needed to produce summaries of assumptions and financial projection worksheets.

3. Financial projection models are designed and programmed, using the data appearing on each worksheet.

4. Printouts of both financial statements and spreadsheet logic are produced by each business.

5. Individuals or team leaders make presentations to the class, succinctly describing the assumptions on which the business was based, the purpose of each model and the specific features used to project financial statements. Each presentation should end with a statement of conclusions and recommendations.

6. Class discussions close with comments on how and why financial planning is linked to other academic subjects.

## G. Financial Modeling's Reliance on Diverse Academic Subjects